H-9

Notice of Allowability	Application No.	Applicant(s)	
	10/723,479	MICHAEL THAMBYNAYAGAM ET AL.	
	Examiner	Art Unit	
	Victor J. Taylor	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *November 25, 2003*.

2. ☒ The allowed claim(s) is/are *1-12*.

3. ☒ The drawings filed on *25 November 2003* are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Drawings

1. The drawings were received on 11/25/2003. These drawings are approved.

Prior Art

2. The prior art made of record and not relied upon is considered pertinent to applicant.

I. Art A of Partyka et al., US 6,131,071 in class 702/016 is cited for the spectral decomposition for seismic data with steps for a time series Fourier transformation and teaches spectral decomposition with processing step to calculate the spectral value using the j, k matrix in figure 8 and teaches the H function with fitting to the tuning cube with off set distances and fitting the equation in line 40 to the matrix form in line 50 of column 34 and further teaches phase related signal attributes and using the least squares estimate of the phase at the center of the sliding analysis window using the equations and derivatives found in lines 1-65 of column 36.

II. Art B of Crider et al., US 6,263,284 in class 702/014 is cited for the selection of seismic modes through amplitude characteristics using AVO analysis 325 in figure 3 and teaches vector estimates of the signal data parameters and teaches the use of the matrix containing angle-dependent quantizes in line 50 column 10

Allowable Subject Matter

3. Claims 1-12 are allowed.

4. The following is an examiner's statement of reasons for allowance:

The gas reservoir evaluation and assessment workstation tool with the method steps for the analytical engine model to produce the pressure predictions and the pressure values from the reservoir input data to generate the output record that is representing the prediction of the pressure values at any point in the reservoir space and at any point in the reservoir point in time comprising the following method modeling steps and system apparatus configured to produce the workstation tool and process the computer modeling steps for the analytical engine is not found in the cited art of record.

I. The method of claim 1 for the gas reservoir workstation evaluation and assessment tool with method computer modeling steps for generating a prediction of values in a reservoir with method steps for "receiving input data characterizing the reservoir"...[and] with steps of "producing a computer model in response to said input data representing said reservoir, the producing step for producing the computer model including the steps of "calculating said values in one dimension associated with a single layer in said reservoir, each of said values existing at a single point in space in said reservoir and at a single point in time in said reservoir"...[and] "calculating said values in said one dimension associated with multiple layers in said reservoir, each of said values in each of said multiple layers existing at a single point in space in said reservoir and at a single point in time in said reservoir"...[and] "calculating said values in three dimensions associated with said multiple layers in said reservoir, each of said values in

each of said multiple layers in said three dimensions existing at a single point in space in said reservoir and at a single point in time in said reservoir"...and/or in combination with the steps wherein "calculating said values in said three dimensions as a function of time, said values being associated with said multiple layers in said reservoir, each of said values in each of said multiple layers in said three dimensions existing at a single point in space in said reservoir, said each of said values in said each of said multiple layers in said three dimensions existing at any future point in time in said reservoir, said computer model being produced in response to the calculating step (b4)"...[and in combination] with the particularly claimed method steps for "verifying the computer model" [and] "using said computer model, generating said prediction of said values in said reservoir in response to the verifying step" to produce and generate the prediction values in a reservoir is not found in the cited art of record.

The prior Art A of teaches the spectral decomposition for seismic data with steps for a time series Fourier transformation and teaches spectral decomposition with processing step to calculate the spectral value using the j, k matrix in figure 8 and teaches the H function with fitting to the tuning cube with off set distances and fitting the equation in line 40 to the matrix form in line 50 of column 34 and further teaches phase related signal attributes and using the least squares estimate of the phase at the center of the sliding analysis window using the equations and derivatives found in lines 1-65 of column 36.

The prior Art B of Crider et al., teaches the selection of seismic modes through amplitude characteristics using AVO analysis 325 in figure 3 and teaches the vector

estimates of the signal data parameters and teaches the use of the matrix containing angle-dependent quantizes in line 50 column 10

Therefore, the prior art Partyka and The prior art of Crider in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claim 2 is dependent on the allowed independent claim 1 and is allowed at least for the reasons cited above.

II. The apparatus of claim 3 for the program storage device tangibly embodying the set of instruction executable by the machine to perform steps to generate the prediction of values in the reservoir with steps for "receiving input data characterizing the reservoir"...[and] with steps of "producing a computer model in response to said input data representing said reservoir, the producing step (b) of producing the computer model including the steps for calculating said values in one dimension associated with a single layer in said reservoir, each of said values existing at a single point in space in said reservoir and at a single point in time in said reservoir"...[and] with steps for "calculating said values in said one dimension associated with multiple layers in said reservoir, each of said values in each of said multiple layers existing at a single point in space in said reservoir and at a single point in time in said reservoir"...[and] with steps "calculating said values in three dimensions associated with said multiple layers in said reservoir, each of said values in each of said multiple layers in said three dimensions existing at a single point in space in said reservoir and at a single point in time in said

reservoir"...and/or in combination with the steps wherein "calculating said values in said three dimensions as a function of time, said values being associated with said multiple layers in said reservoir, each of said values in each of said multiple layers in said three dimensions existing at a single point in space in said reservoir, said each of said values in said each of said multiple layers in said three dimensions existing at any future point in time in said reservoir, said computer model being produced in response to the calculating step"...[and/or] "verifying the computer model"...[and in combination] with the particularly claimed steps for "using said computer model, generating said prediction of said values in said reservoir in response to the verifying step" to produce and generate the prediction values in a reservoir is not found in the cited art of record.

The prior Art A of teaches the spectral decomposition for seismic data with steps for a time series Fourier transformation and teaches spectral decomposition with processing step to calculate the spectral value using the j, k matrix in figure 8 and teaches the H function with fitting to the tuning cube with off set distances and fitting the equation in line 40 to the matrix form in line 50 of column 34 and further teaches phase related signal attributes and using the least squares estimate of the phase at the center of the sliding analysis window using the equations and derivatives found in lines 1-65 of column 36.

The prior Art B of Crider et al., teaches the selection of seismic modes through amplitude characteristics using AVO analysis 325 in figure 3 and teaches the vector estimates of the signal data parameters and teaches the use of the matrix containing angle-dependent quantizes in line 50 column 10

Therefore, the prior art Partyka and The prior art of Crider in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claim 4 is dependent on the allowed independent claim 3 and is allowed at least for the reasons cited above.

III. The system of claim 5 for the system adapted for generating a prediction of values in a reservoir for generating a prediction in a reservoir with "a first apparatus adapted for receiving input data characterizing the reservoir"...[and] with "a second apparatus adapted for producing a computer model in response to said input data representing said reservoir, said second apparatus adapted for producing said computer model including"...[and] with "a third apparatus adapted for calculating said values in one dimension associated with a single layer in said reservoir, each of said values existing at a single point in space in said reservoir and at a single point in time in said reservoir"...[and] with "a fourth apparatus adapted for calculating said values in said one dimension associated with multiple layers in said reservoir, each of said values in each of said multiple layers existing at a single point in space in said reservoir and at a single point in time in said reservoir"...[and] with "a fifth apparatus adapted for calculating said values in three dimensions associated with said multiple layers in said reservoir, each of said values in each of said multiple layers in said three dimensions existing at a single point in space in said reservoir and at a single point in time in said reservoir"...and/or in combination with "a sixth apparatus adapted for calculating said

values in said three dimensions as a function of time, said values being associated with said multiple layers in said reservoir, each of said values in each of said multiple layers in said three dimensions existing at a single point in space in said reservoir, said each of said values in said each of said multiple layers in said three dimensions existing at any future point in time in said reservoir, said computer model being produced in response to the calculating performed by said sixth apparatus"...[and/or] with "a seventh apparatus adapted for verifying the computer model thereby generating a verified computer model"...[and in combination] with the "eighth apparatus, responsive to the verified computer model, adapted for generating said prediction of said values in said reservoir in response to the verifying performed by the seventh apparatus" to produce and generate the prediction values in a reservoir is not found in the cited art of record.

The prior Art A of teaches the spectral decomposition for seismic data with steps for a time series Fourier transformation and teaches spectral decomposition with processing step to calculate the spectral value using the j, k matrix in figure 8 and teaches the H function with fitting to the tuning cube with off set distances and fitting the equation in line 40 to the matrix form in line 50 of column 34 and further teaches phase related signal attributes and using the least squares estimate of the phase at the center of the sliding analysis window using the equations and derivatives found in lines 1-65 of column 36.

The prior Art B of Crider et al., teaches the selection of seismic modes through amplitude characteristics using AVO analysis 325 in figure 3 and teaches the vector

estimates of the signal data parameters and teaches the use of the matrix containing angle-dependent quantizes in line 50 column 10

Therefore, the prior art Partyka and The prior art of Crider in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claim 6 is dependent on the allowed independent claim 5 and is allowed at least for the reasons cited above.

IV. The method of claim 7 for a method of producing a computer model in response to input data representing a reservoir for generating a pressure value prediction of a reservoir with method steps for "calculating values in one dimension associated with a single layer in said reservoir, each of said values existing at a single point in space in said reservoir and at a single point in time in said reservoir"...[and] with steps of "calculating said values in said one dimension associated with multiple layers in said reservoir, each of said values in each of said multiple layers existing at a single point in space in said reservoir and at a single point in time in said reservoir"...[and] with for "calculating said values in three dimensions associated with said multiple layers in said reservoir, each of said values in each of said multiple layers in said three dimensions existing at a single point in space in said reservoir and at a single point in time in said reservoir"...and/or in combination with the particularly claimed steps wherein "the calculating said values in said three dimensions as a function of time, said values being associated with said multiple layers in said reservoir, each of said values

in each of said multiple layers in said three dimensions existing at a single point in space in said reservoir, said each of said values in said each of said multiple layers in said three dimensions existing at any future point in time in said reservoir, said computer model being produced in response to the calculating step" to produce and generate the prediction values in a reservoir is not found in the cited art of record.

The prior Art A of teaches the spectral decomposition for seismic data with steps for a time series Fourier transformation and teaches spectral decomposition with processing step to calculate the spectral value using the j, k matrix in figure 8 and teaches the H function with fitting to the tuning cube with off set distances and fitting the equation in line 40 to the matrix form in line 50 of column 34 and further teaches phase related signal attributes and using the least squares estimate of the phase at the center of the sliding analysis window using the equations and derivatives found in lines 1-65 of column 36.

The prior Art B of Crider et al., teaches the selection of seismic modes through amplitude characteristics using AVO analysis 325 in figure 3 and teaches the vector estimates of the signal data parameters and teaches the use of the matrix containing angle-dependent quantizes in line 50 column 10

Therefore, the prior art Partyka and The prior art of Crider in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claim 8 is dependent on the allowed independent claim 7 and is allowed at least for the reasons cited above.

V. The apparatus of claim 9 for the program storage device readable by a machine tangibly embodying a program of instructions executable by the machine to perform method steps for producing a computer model in response to input data representing a reservoir with steps for "calculating values in one dimension associated with a single layer in said reservoir, each of said values existing at a single point in space in said reservoir and at a single point in time in said reservoir"...[and] with steps of "calculating said values in said one dimension associated with multiple layers in said reservoir, each of said values in each of said multiple layers existing at a single point in space in said reservoir and at a single point in time in said reservoir"...[and] with for "calculating said values in three dimensions associated with said multiple layers in said reservoir, each of said values in each of said multiple layers in said three dimensions existing at a single point in space in said reservoir and at a single point in time in said reservoir"...[and in combination] with the particularly claimed steps for ""calculating said values in said three dimensions as a function of time, said values being associated with said multiple layers in said reservoir, each of said values in each of said multiple layers in said three dimensions existing at a single point in space in said reservoir, said each of said values in said each of said multiple layers in said three dimensions existing at any future point in time in said reservoir, said computer model being produced in response to the calculating step (d) to produce and generate the prediction values in a reservoir is not found in the cited art of record.

The prior Art A of teaches the spectral decomposition for seismic data with steps for a time series Fourier transformation and teaches spectral decomposition with processing step to calculate the spectral value using the j, k matrix in figure 8 and teaches the H function with fitting to the tuning cube with off set distances and fitting the equation in line 40 to the matrix form in line 50 of column 34 and further teaches phase related signal attributes and using the least squares estimate of the phase at the center of the sliding analysis window using the equations and derivatives found in lines 1-65 of column 36.

The prior Art B of Crider et al., teaches the selection of seismic modes through amplitude characteristics using AVO analysis 325 in figure 3 and teaches the vector estimates of the signal data parameters and teaches the use of the matrix containing angle-dependent quantizes in line 50 column 10

Therefore, the prior art Partyka and The prior art of Crider in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claim 10 is dependent on the allowed independent claim 9 and is allowed at least for the reasons cited above.

VI. The method of claim 11 for the system adapted for producing a computer model in response to the input data representing a reservoir with "a first apparatus adapted for calculating values in one dimension associated with a single layer in said reservoir, each of said values existing at a single point in space in said reservoir and at

a single point in time in said reservoir"...[and] with "a second apparatus adapted for calculating said values in said one dimension associated with multiple layers in said reservoir, each of said values in each of said multiple layers existing at a single point in space in said reservoir and at a single point in time in said reservoir"...[and] with "a third apparatus adapted for calculating said values in three dimensions associated with said multiple layers in said reservoir, each of said values in each of said multiple layers in said three dimensions existing at a single point in space in said reservoir and at a single point in time in said reservoir"...[and in combination] with the particularly claimed "fourth apparatus adapted for calculating said values in said three dimensions as a function of time, said values being associated with said multiple layers in said reservoir, each of said values in each of said multiple layers in said three dimensions existing at a single point in space in said reservoir, said each of said values in said each of said multiple layers in said three dimensions existing at any future point in time in said reservoir, said computer model being produced when said fourth apparatus calculates said values in said three dimensions as a function of time" to produce and generate the prediction values in a reservoir is not found in the cited art of record.

The prior Art A of teaches the spectral decomposition for seismic data with steps for a time series Fourier transformation and teaches spectral decomposition with processing step to calculate the spectral value using the j, k matrix in figure 8 and teaches the H function with fitting to the tuning cube with off set distances and fitting the equation in line 40 to the matrix form in line 50 of column 34 and further teaches phase related signal attributes and using the least squares estimate of the phase at the center

of the sliding analysis window using the equations and derivatives found in lines 1-65 of column 36.

The prior Art B of Crider et al., teaches the selection of seismic modes through amplitude characteristics using AVO analysis 325 in figure 3 and teaches the vector estimates of the signal data parameters and teaches the use of the matrix containing angle-dependent quantizes in line 50 column 10

Therefore, the prior art Partyka and The prior art of Crider in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claim 12 is dependent on the allowed independent claim 11 and is allowed at least for the reasons cited above.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor J. Taylor whose telephone number is 517-272-2281. The examiner can normally be reached on 8:00 to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow can be reached on 571-272-2863. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

VJT
March 18, 2005.

John Barlow
Supervisory Patent Examiner
Technology Center 2800